REMARKS

An Excess Claim Fee for four (4) additional claims and one (1) additional independent claim is attached herewith.

Claims 1-24 are all the claims presently pending in the application. Claims 1-15, and 18-20 are amended to more clearly define the invention. Claims 21-24 are added. Claims 1, 10, 12, 14-17, and 24 are independent.

These amendments are made only to more particularly point out the invention for the Examiner and not for narrowing the scope of the claims or for any reason related to a statutory requirement for patentability.

Applicant also notes that, notwithstanding any claim amendments herein or later during prosecution, Applicant's intent is to encompass equivalents of all claim elements.

Applicant gratefully acknowledges that claims 7-8 would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. However, Applicant respectfully submits that all of the claims are allowable.

Claims 1-2, 4, 9-10, 12, and 19 stand rejected under 35 U.S.C. §102(e) as being anticipated by Sambamurthy, et al. (USPN 6,393,489). Claims 3, 11, 13-18, and 20 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Sambamurthy, et al., in view of Brown, et al. (USPN 6,046,817). Claims 5-6 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Sambamurthy, et al., in view of Ellis, et al. (USPN 6,119,195).

These rejections are respectfully traversed in the following discussion.

I. THE CLAIMED INVENTION

A first exemplary embodiment of the claimed invention, as defined by independent claim 1, is directed to a transceiver circuit of a network node for converting a signal received from a transmission medium to a decoded signal that can be recognized by a higher layer and transmitting packets received from the higher layer to the transmission medium. The circuit includes selector circuitry, and control circuitry. The control circuitry controls the selector circuitry to supply the decoded signal to the higher layer and to supply an idle signal, instead of the decoded signal, to the higher layer for a predefined time interval which starts at the end timing of a packet transmitted from the higher layer to the transmission medium. The idle signal indicates that the network node is in an idle state.

A second exemplary embodiment of the claimed invention, as defined by independent claim 10, is directed to a communication method for a network node for converting a signal received from a transmission medium to a decoded signal that can be recognized by a higher layer and transmitting packets received from the higher layer to the transmission medium. The method includes supplying an idle signal, instead of the decoded signal, to the higher layer for a predefined time interval which starts at the end timing of a packet transmitted from the higher layer to the transmission medium. The idle signal indicates that the network node is in an idle state. The method further includes supplying the decoded signal to the higher layer at the end timing of the predefined time interval.

A third exemplary embodiment of the claimed invention, as defined by independent claim 14, is directed to a communication method for a network node attached to a serial bus. the method includes setting a state machine in a receive mode, exchanging signals between the network node and a remote node attached to a distant end of the bus and determining therefrom a

turnaround time between the nodes, and <u>setting the state machine in an idle mode for an interval beginning with an end timing of a packet transmitted from the node to the bus until the interval corresponds to the turnaround time</u>.

Conventional parent/child networks, such as IEEE-1394 standard networks, an example of which is shown in Fig. 4A - 4D, have certain difficulties. These difficulties may primarily be due to a communication length which is longer than 4.5 meters which may require the use of 8B/10B block codes. For example, as shown in Fig. 5A, as long as the length of the Data Prefix D4 is greater than the turnaround time, then contention is prevented between the packet P5 and the Grant signal G3. Further, in order for a packet from the root node 2 to be transmitted without encountering the Request signal R2, it is necessary that the length of the Data Prefix D3 is greater than the turnaround time between nodes 2 and 3.

One of the problems for these conventional networks is the likelihood of a situation in which a Request signal remains asserted (i.e. is not canceled) in a longer than 4.5 meter bus section and contends with other signals. For example, as shown in Figs. 8A - 8C, if the data length of the packet from node 3 to node 4 is shorter than the distance between nodes 3 and 4, then node 3 will receive a "ghost" request signal from node 4, which prevents node 1 from receiving an acknowledgment signal from node 4 indicating receipt of the packet by node 4.

The cause of this problem is illustrated by the timing diagram of Fig. 9, which shows that node 3 transitions from the Idle state into a Request state because of the receipt of a Request signal from node 4 despite the fact that node 3 has transmitted a data packet to node 4. Therefore, even though node 4 receives the data packet and sends an acknowledgment signal to node 3, node 3 ignores the acknowledgment signal because node 3 is in a Request state and is waiting for a Grant signal from node 2.

The present invention solves this problem by ensuring that the transceiver in the network maintains an Idle state for a period of time that corresponds to the turnaround time between other nodes.

The present invention provides this capability by providing a transceiver with a selector and a controller that controls the selector to supply an idle signal (instead of, for example, a decoded signal) to a higher layer for a predefined time interval which starts at the end timing of a packet transmitted from the higher layer to the transmission medium. In this manner, because of the idle signal being supplied to the higher layer for the predefined time interval, the higher layer is maintained in an Idle state for the predefined time interval.

In an exemplary, non-limiting embodiment, the predefined time interval corresponds to the turnaround time between nodes on the network. The predefined time interval may be determined during a Tree ID process as shown in Fig. 11 and stored in a counter 24 (Fig. 10). Then, during normal operation, a comparator 33 may compare the output signal from a counter 32 that counts the amount of time elapsed from an end of data signal and may then control a flip-flop 30 to ensure that a selector 29 sends an Idle signal to the higher layer.

II. THE PRIOR ART REJECTIONS

A. The 102(e) Sambamurthy et al. reference rejection

Regarding the rejection of claims 1-2, 4, 9-10, 12, and 19, the Examiner alleges that the Sambamurthy et al. reference teaches the claimed invention. Applicant submits, however, that there are elements of the claimed invention which are neither taught nor suggested by the Sambamurthy et al. reference.

Contrary to the Examiner's allegations, the Sambamurthy et al. reference does not teach

or suggest the features of the present invention including a selector that supplies an idle signal to a higher layer for a predefined time interval, let alone a controller for controlling the selector. As explained above, this feature is important for maintaining the higher layer in an Idle state for the predefined time interval.

The Examiner alleges that the SUPERMAC management device 117 corresponds to the claimed selector circuitry. However, contrary to the Examiner's allegations, the SUPERMAC management device 117 does not transmit any signal at all to a higher layer, let alone transmit an idle signal to the higher layer, an idle signal to a higher layer for a predefined time interval, or an idle signal that indicates that the network node is in an idle state.

Rather, the SUPERMAC management block 117 forms a portion of a flow based media access controller 150 (Fig. 2). The flow based media access controller 150 communicates to other nodes on the network through the physical medium 140 and communicates with an upper layer through a network data system bus 101 and management/control bus 102. The upper layer in this Ethernet network is a logic link control layer 14a (Fig. 1A).

The Sambamurthy et al. reference clearly explains that the SUPERMAC management block 117 "is responsible for interfacing between transmitting SUPERMAC Tx controller 118 and a receiving SUPERMAC Rx controller 120," interfacing "with network flow managing FIFO Tx controller 110, a network flow managing FIFO Rx controller 112, and network data BIC 104." (Col. 10, lines 50 - 56). The SUPERMAC management block 117 "functions as an interface that receives flow control information, auto negotiation commands, physical management commands, and pause frame information." (Emphasis added, col. 10, lines 56-60).

Therefore, contrary to the Examiner's allegations, the SUPERMAC management block 117 does not communicate at all with an upper layer, let alone transmit a signal to an upper layer,

transmit an idle signal to the higher layer, transmit an idle signal to a higher layer for a predefined time interval, or transmit an idle signal that indicates that the network node is in an idle state.

Further, the Examiner alleges that the transmit control block 210 (Fig. 4) corresponds to the claimed control circuitry. However, the transmit control block 210 forms a portion of the SUPERMAC Tx controller 118 (col. 13, lines 49-51), which is controlled by the SUPERMAC management block 117 (col. 13, lines 12-47). In other words, and quite the opposite from the Examiner's allegations, the SUPERMAC management block 117 controls the SUPERMAC Tx controller 118. Thus, the Examiner's alleged control circuitry 210 does not control the management block 117 (the Examiner alleges is the "selector circuitry") as claimed. Rather, the Examiner's alleged control circuitry 210 is controlled by the Examiner's alleged selector circuitry 117.

Moreover, the Examiner appears to be confused because the Examiner alleges that "Figure 8" (sic) of the Sambamurthy et al. reference illustrates "steps 802, 806, 820." However, contrary to the Examiner's allegations, Figures 8A and 8B illustrate a carrier control state machine in Figure 8A and a frame control state machine in Figure 8B. Therefore, the Sambamurthy et al. reference explains that 802 corresponds to an idle state, 806 corresponds to a frame state and 820 corresponds to "another condition 820 where it is determined whether the packet has ended." (Col. 24, line 61 - col. 26, line 61) Therefore, contrary to the Examiners's allegations Figures 8A and 8B do not teach or suggest an idle signal. Rather, these Figures 8A and 8B merely disclose an idle state.

Further, Figures 8A and 8B illustrate a carrier control state machine and a frame control state machine that is contained within the ETHER block 212 of the transmit control block 210

shown in Fig. 4 (col. 24, lines 61-63 and col. 25, line 65 - col. 26, line 3). Thus, as shown in Fig 4, since the ETHER block 212 forms a portion of the SUPERMAC Tx controller 118 this portion of the Sambamurthy et al. reference has absolutely nothing to do with sending any signal at all to a higher level, let alone transmitting an idle signal to the higher layer, an idle signal to a higher layer for a predefined time interval, or an idle signal that indicates that the network node is in an idle state.

Lastly, the Sambamurthy et al. reference does not have anything to do with the problems which are solved by the present invention. Indeed, the Sambamurthy et al. reference does not suffer from the problems that are addressed by the present invention.

Rather, as explained in detail in the present specification and above, the present invention is concerned with addressing the problems of parent/child (i.e., serial) networks, such as exemplarily in an IEEE-1394 network, but, of course, the invention is not limited to this specific network. The independent claims each define this type (e.g., parent/child).

In stark contrast, the Sambamurthy et al. reference is only concerned with a completely different and unrelated type of network. The Sambamurthy et al. reference is only concerned with addressing the problems of an Ethernet network, such as an IEEE-802.3 network.

These are two completely different and unrelated types of networks, while, of course, not limiting the independent claims or the scope of the invention, the following is offered for the Examiner's increased understanding and convenience.

IEEE 802.3 is defined as "A Local Area Network protocol suite commonly known as Ethernet." (Newton's Telecom Dictionary, page 439, 2000). "Ethernet specifies a CSMA/CD (Carrier Sense Multiple Access with Collision Detection). CSMA/CD is a technique of sharing a common medium (wire, coaxial cable) among several devices." (Emphasis added, Id. at page

331). "Ethernet uses a bus or star topology" (Microsoft Computer Dictionary, Fourth Edition, page 172). A bus network is "A topology (configuration) for a LAN (local area network) in which all nodes are connected to a main communications line (bus)." (Emphasis added, Id. at page 67). In other words, all devices share the same communication media. Thus, this type of shared medium requires the need for sophisticated "collision detection." Therefore, since all devices share the same communication media, all of the devices are aware of the communications taking place on the network and there is never a problem with devices switching states prematurely.

In stark contrast, IEEE 1394 is "also known as Firewire. An IEEE data transport bus . . The bus can be tree, daisy chained or any combination." (Emphasis added, Newton's Telecom Dictionary at page 439). Firewire is a "100 Mbps serial bus . . . It's designed for up to 4.5 meters per segment." (Emphasis added, Id at page 361). In other words, the devices on a serial bus are connected in series. Each node having a dedicated connection to the next node and each data packet must be handed off between nodes. Therefore, it is quite common for nodes to not be aware of other communications that are taking place across the network.

In summary, not only does the Sambamurthy et al. reference not teach or suggest the feature of the present invention, but the Sambamurthy et al. reference does not teach or suggest a network system that suffers from or provides a solution to the problems that are solved by the present invention.

Therefore, the Sambamurthy et al. reference does not teach or suggest each and every element of the claimed invention. Therefore, the Examiner is respectfully requested to withdraw this rejection of claims 1-2, 4, 9-10, 12, and 19.

B. The 103(a) Sambamurthy et al. reference in view of the Brown et al. reference

Regarding claims 3, 11, 13-18, and 20, the Examiner alleges that the Brown et al. reference would have been combined with the Sambamurthy et al. reference to form the claimed invention. Applicant submits, however, that these references would not have been combined and, even if combined, the combination would not teach or suggest each and every element of the claimed invention.

Applicant submits that these references would not have been combined as alleged by the Examiner. Indeed, the references are directed to completely different matters and problems.

Specifically, the Sambamurthy et al. reference is directed to <u>improving an Ethernet network</u> to increase data throughput, handle critical flow control issues and handling management and network diagnostics (col. 3, line 64 - col. 4, line 1). In particular, the Sambamurthy et al. reference is directed to providing <u>a media access control layer process for an Ethernet network</u> that allows for in-line packet-by-packet processing of data information and control information to modify a packet's characteristics while it is being processed for transmission or reception and to allow users to manage the flow of packet data and to perform sophisticated diagnostic testing (col. 4, lines 49-58).

In stark contrast, the Brown et al. reference is directed to the <u>completely different and unrelated</u> problem of providing <u>a printer that is capable of dynamically allocating buffers for its input/output communications ports</u> (col. 3, lines 41-57). One of ordinary skill in the art at the time of the invention who was concerned with <u>improving an Ethernet network</u> to increase data throughput, handle critical flow control issues and handling management and network diagnostics as the Sambamurthy et al. reference is concerned with providing <u>would not have</u>

referred to the Brown et al. reference because the Brown et al. reference is directed to the completely different and unrelated problem of providing a printer that is capable of dynamically allocating buffers for its input/output communications ports. Thus, the references would not have been combined.

Further, Applicant submits that the Examiner can point to no motivation or suggestion in the references to urge the combination as alleged by the Examiner.

The Examiner alleges that it would have been obvious to one of ordinary skill in the art at the time the invention was made to "add a method that determine (sic) a turnaround time between the nodes, such as suggested by Brown (sic), in the method of Sambamurthy (sic) in order to prevent bus and node contention."

However, neither of the applied references teaches or suggests any relation at all between the determination of a turnaround time and how that might "prevent bus and node contention." Rather, the Brown et al. reference describes an infrared (IR) link and explains that when an IR station wants to initiate a dialog it assumes the role of primary and starts a discovery process (col. 9, lines 2-3). "Through a standardized process the primary determines the existence of all IR stations within its range" (col. 9, lines 4-5). The primary sends a command to the station with which it wants to communicate along with the communication capabilities of the primary and the secondary will compare the primary's capabilities to its own and determine the best set of communication parameters. These communications parameters include a maximum and minimum turnaround time. (Col. 9, lines 12-28). The maximum turnaround time is the total amount of time that a station is permitted to hold onto the communication channel before being required to "turn the channel around" and allow the other station a chance to use the channel. (Col. 10, lines21-26). The minimum turnaround time is the amount of time that the

communication channel must remain idle after sending station and the receiving station switch roles, i.e. the amount of time that the channel must remain idle after the channel is turned around (col. 10, lines 28-31). Nowhere is there any discussion in any of the applied references that relate the determination of a turnaround time to prevent bus and node contention. Therefore, contrary to the Examiner's allegations, one of ordinary skill in the art wound not have been motivated to add a method of determining a turnaround time between modes as disclosed by the Brown et al. reference to the method that is disclosed by the Sambamurthy et al. reference "in order to prevent bus and node contention."

Moreover, even assuming arguendo that one of ordinary skill in the art would have been motivated to combine these references, the combination would not teach or suggest each and every element of the claimed invention.

First, with regard to dependent claims 3, 11, 13, and 18, the above deficiencies of the Sambamurthy et al. are not overcome.

Secondly, None of the applied references teaches or suggests the features of the claimed invention including: 1) determining a turnaround time between nodes based upon an exchange of signals between nodes; and 2) setting the state machine in an idle mode after transmitting an end packet for an amount of time that corresponds to the turnaround time.

The Examiner alleges that the Sambamurthy et al. reference discloses "exchanging samples between the network node and remote node for an interval beginning with end timing of a packet transmitted from the node to the bus (column 27, lines 41-43; column 31, lines 15-48)."

Firstly, contrary to the Examiner's allegations, the Sambamurthy et al. reference does not teach or suggest anything at all regarding exchanging samples.

Secondly, assuming that the Examiner intended to state exchanging signals, the

Sambamurthy et al. reference does not teach or suggest exchanging signals for an interval beginning with an end timing of a packet transmitted from the node to the bus. Indeed, this is exactly the opposite from what the Sambamurthy et al. reference discloses. An end timing of a packet is an indicator of the end of a transmission. Therefore, once the end packet is transmitted no signal is exchanged.

Thirdly, the Examiner's citations to column 27, 41-43 and column 31, lines 15-48 have absolutely nothing to do with what the Examiner contends that these citations support.

Column 27, lines 41-43 merely states that once the receiver LLC interface 902 has performed appropriate processing on a received packet that a 32-bit data packet is output to the LLC upper layer. Therefore, contrary to the Examiner's allegation, col. 27, lines 41-43 of the Sambamurthy et al. reference has absolutely nothing to do with exchanging signals after an end timing of a packet. Indeed, this citation is only relevant to sending of signals within a node to an upper layer.

Col. 31, lines 15-48 describes a state machine diagram that is illustrated in Figure 12. The state machine diagram is for a receiver control block 910 that is illustrated in Figure 9. This citation explains how the receiver changes from an idle state to a data state when a packet is being received (col. 31, lines 15-24), changing from the data state to a carrier extension state when the packet stops (lines 25-32), returning to the idle state when the packet length is validated (lines 25-41) and changing to a flush state when the packet is not validated (lines 42-48). Therefore, contrary to the Examiner's allegations col. 31, lines 15-48 does not teach or suggest exchanging signals for an interval beginning with an end timing packet.

Further, not only does the Sambamurthy et al. reference not teach or suggest the features which the Examiner alleges are disclosed, but the Examiner's allegations are not relevant to the

claims.

The Examiner alleges that the Sambamurthy et al. reference discloses "exchanging samples (signals) between the network node and remote node for an interval beginning with end timing of a packet." In contrast, independent claim 14, for example, recites exchanging signals to determine a turnaround time and setting the state machine in an idle mode for an interval beginning with an end timing that corresponds to the turnaround time. The Examiner does not even attempt to allege that any of the references disclose determining the turnaround time based upon the exchange of signals.

This is a key point which the Examiner appears to have completely misunderstood or ignored.

The Examiner points out that the Brown et al. reference discloses a turnaround time that a station may hold onto a communication channel before "turning the channel around" (i.e allowing another station to use the channel). Thus, the turnaround time that is disclosed by the Brown et al. reference is not determined from an exchange of signals between the network node and the remote node.

The Brown et al. reference and the Sambamurthy et al. reference are both relevant to a context where communication devices (nodes) communicate using a common communication medium. Therefore, as explained above, because only a single communication link is shared by all of the nodes, contention for the communication link can be a problem. The Brown et al. reference provides a turnaround time which prevents any single node from monopolizing the communications link and forces it to share the link with the other nodes. Thus, each node is limited to a maximum turnaround time.

In stark contrast, the present invention of independent claims 14-17 is concerned with

addressing problems of a serial bus that includes nodes that are connected in series. In other words, the devices are not connected to a common communication media. As explained above, the present invention sets (i.e. maintains) the state machine in an idle state for a time interval that corresponds to the turnaround time (i.e. the sum of the time it takes for a signal from the local node to reach a remote node and for a signal from the remote node to reach the local node).

These turnaround times are completely different.

Therefore, the Examiner is respectfully requested to withdraw the rejection of claims 3, 11, 13-18, and 20.

C. The 103(a) Sambamurthy et al. reference in view of the Ellis et al. reference

Regarding claims 5-6, the Examiner alleges that the Ellis et al. reference would have been combined with the Sambamurthy et al. reference to form the claimed invention. Applicant submits, however, that these references would not have been combined and even if combined, the combination would not teach or suggest each and every element of the claimed invention.

First, Applicant submits that these references would not have been combined as alleged by the Examiner. Indeed, the references are directed to completely different matters and problems.

As explained above, the Sambamurthy et al. reference is directed to improving an Ethernet network.

In stark contrast, the Ellis et al. reference is concerned with the completely different and unrelated problem of providing an efficient method and apparatus to provide a communication interface between a serial bus device and a parallel port. One of ordinary skill in the art would not have been motivated to modify the media access control layer for the Ethernet network that is

disclosed in the Sambamurthy et al. reference based upon the disclosure of the Ellis et al. reference because the Ellis et al. reference has absolutely nothing to do with Ethernet networks. Thus, the references would not have been combined.

Indeed, the references would not be operable even if combined.

The Sambamurthy et al. reference discloses a media access controller for a device that operates within an Ethernet network under the IEEE 802.3 standard.

In stark contrast, the Ellis et al. reference discloses a USB-to-parallel port interface that enables a USB device (i.e. a serial bus device) to operate on an ISA/EISA bus.

These devices are completely unrelated and the media access controller that is disclosed by the Sambamurthy et al. reference would not operate properly if it was modified to include the USB-to-parallel port interface that is disclosed by the Ellis et al. reference.

Further, it is also not clear that any Ethernet network would operate properly if modified to include the USB-to-parallel port interface that is disclosed by the Ellis et al. reference.

Applicant also submits that the Examiner can point to no motivation or suggestion in the references to urge the combination as alleged by the Examiner. Indeed, the Examiner does not even support the combination by identifying a reason for combining the references.

The Examiner alleges that "It would have been obvious to one ordinary (sic) skill in the art at the time the invention was made to add IEEE-1394 serial bus standard, such as that suggested by Ellis, in the apparatus of Sambamurthy (sic) in order to provide a high-speed data transfer and real-time transfer."

Firstly, the media access controller that is disclosed by the Sambamurthy et al. reference operates on an Ethernet network that uses the IEEE 802.3 protocol for communication. The IEEE 802.3 is designed to operate upon networks that include a common communication

medium that is shared among all of the devices on the network. This is also referred to as a star topology.

In stark contrast, the IEEE 1394 standard provides a protocol for communication on a network that includes a daisy chain topology. In other words, the devices that use the IEEE 1394 protocol are connected in series.

These two protocols are incompatible with each other and could not be combined in any manner, let alone the manner which the Examiner alleges "would have been obvious to one ordinary (sic) skill in the art."

Secondly, the Examiner's alleged motivation to combine these references is "to provide a high-speed data transfer and real-time transfer." However, the Examiner does not provide any citation at all to support this allegation.

Indeed, it is highly unlikely that any modification of an Ethernet network that connects devices using a common communication medium would operate at all if modified to operate according to IEEE 1394, which is designed to only operate on networks having devices that have been daisy chained together.

Even assuming arguendo that one of ordinary skill in the art would have been motivated to combine these references, the combination would not teach or suggest each and every element of the claimed invention.

As explained above, the Sambamurthy et al. reference does not teach or suggest the features of the present invention including a selector that supplies an idle signal, instead of the decoded signal, to a higher layer for a predefined time interval. As explained above, this feature is important for maintaining the higher layer in an Idle state for the predefined time interval. In this manner, nodes on an IEEE-1394 standard network that are further than 4.5 meters away from

a parent node are sure to have an acknowledgment signal delivered to another node which may have transmitted data to the node.

The Ellis et al. reference does not remedy the deficiencies of the Sambamurthy et al. reference.

Therefore, the Examiner is respectfully requested to withdraw the rejection of claims 5-6.

III. FORMAL MATTERS AND CONCLUSION

The Office Action objects to the drawings. This Amendment encloses replacement drawing sheets, which correct Figures 3, 4A-4D, 5A-5B, and 6 to include the legend “Prior Art.” Applicant respectfully requests withdrawal of this objection.

In view of the foregoing amendments and remarks, Applicant respectfully submits that claims 1-24, all the claims presently pending in the Application, are patentably distinct over the prior art of record and are in condition for allowance. The Examiner is respectfully requested to pass the above application to issue at the earliest possible time.

Should the Examiner find the Application to be other than in condition for allowance, the Examiner is requested to contact the undersigned at the local telephone number listed below to discuss any other changes deemed necessary in a <u>telephonic or personal interview</u>.

The Commissioner is hereby authorized to charge any deficiency in fees or to credit any overpayment in fees to Attorney's Deposit Account No. 50-0481.

Respectfully Submitted,

Date: 3/3/04

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program funded by the European

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ass 5 digital central office. See also End

telephone company definition. In order
customers the ability to make outgoing
nergency, the telephone company's
epartment designates these customers
les of essential lines are: police and fire
ice companies, hospitals, etc. Whenever
s activated, outgoing service may be
ionessential customers in order to pre-
ng capacity for those customers having
. Also see - Class A lines.
1. A service provided by a telecommu-
ch as an operating telephone company
of priority dial tone. Generally, only up
ustomers may request this type of ser-
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ommended for use in conjunction with
gency) telecommunications services.
ced essex) is some local phone com-
ex. See Centrex.
ection A telephone company term. A
all necessary switching or operating
to connect the calling and called lines.
is somewhat broader than the term
at it includes established connections
nents, as well as completed calls. A
nection between two telephones.
e Zone. This term is used in conjunc-
y service. An ESZ is a geographic area
que mix of emergency services. Each
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bles 911 service to properly route

on. Refers to the central office link with

. The cellular technology used in the
her countries. It is developed from the
. See also AMPS, TACS, NTACS and

conducts his business by electronic
the Internet and the world wide web.
nd-of-transmission block. The binary
x is 71.
out Cellular is an error correction cel-

lular communications protocol, which helps prevent disruptive signal fading and thus reduces the number of dropped calls.

Etched Antiglare treatment that prevents glare but also reduces screen sharpness and clarity on monitors. Generally considered an obsolete technology.

Eternity Hold Our own creation for what happens when someone puts you on long-term hold. Governmental agencies, airlines and police departments (especially when you need them) tend to be firm believers in placing their callers on Eternity Hold. A new service adjunct to Eternity Hold is Conference Hold. Here everyone on Eternity Hold can speak to each other. We made this up. It doesn't exist, but we think it would be great if it did.

Ether The medium which, according to one theory, permeates all space and matter and which transmits all electromagnetic waves.

EtherRing ADC Telecommunications' name for a "revolutionary new idea allowing transport of native mode Ethernet and Fast Ethernet (100 million bits per second) data packets over a wide area network (WAN). Unlike typical Ethernet transport solutions," according to ADC Telecommunications (www.adc.com), "EtherRing has no distance limitations."

Ethernet A local area network used for connecting computers, printers, workstations, terminals, servers, etc., within the same building or campus. Ethernet operates over twisted wire and over coaxial cable at speeds up to 10 million bits per second (Mbps). For LAN interconnection, Ethernet is a physical link and data link protocol reflecting the two lowest layers of the DNA/OSI model. The theoretical limit of Ethernet, measured in 64 byte packets, is 14,800 packets per second (PPS). By comparison, Token Ring is 30,000 and FDDI is 170,000. Ethernet specifies a CSMA/CD (Carrier Sense Multiple Access with Collision Detection). CSMA/CD is a technique of sharing a common medium (wire, coaxial cable) among several devices. As Byte Magazine explained in its January, 1991 issue, Ethernet is based on the same etiquette that makes for a polite conversation: "Listen before talking." Of course, even when people are trying not to interrupt each other, there are those embarrassing moment when two people accidentally start talking at the same time. This is essentially what happens in Ethernet networks, where such a situation is called a collision. If a node on the network detects a collision, it alerts the other nodes by jamming the network. Then, after a random pause, the sending nodes try again. The messages are called frames (see the diagram).

The first personal computer Ethernet LAN adapter was shipped by 3Com on September 29, 1982 using the first Ethernet silicon from SEEQ Technology. Bob Metcalfe created the original Ethernet specification at Xerox PARC and later went on to found 3Com. In the October 31, 1994 issue of the magazine InfoWorld, Bob Metcalfe explained that Ethernet got its name "when I was writing a memo at the Xerox Palo Alto Research Center on May 22, 1973. Until then I had been calling our proposed multimegabit LAN the Alto Aloha Network. The purpose of the Alto Aloha Network was to connect experimental personal computers called Altos. And it used randomized retransmission ideas from the University of Hawaii's Aloha System packet radio network, circa 1970. The word ether came from luminiferous ether — the omnipresent passive medium once theorized to carry electromagnetic waves through space, in particular light from the Sun to the Earth. Around the time of Einstein's Theory of Relativity, the light-bearing ether was proven not to exist. So, in naming our LAN's omnipresent passive medium, then a coaxial cable, which would propagate electromagnetic waves, namely data packets, I chose to recycle ether. Hence, Ethernet."

According to Metcalfe, "Ethernet has been renamed repeatedly since 1973. In 1976, when Xerox began turning Ethernet into a product at 20 million bits per second (Mbps), we called it The Xerox Wire. When Digital, Intel, and Xerox decided in 1979 to make it a LAN standard at 10 Mbps, they went back to Ethernet. IEEE tried calling its Ethernet standard 802.3 CSMA/CD — carrier sense multiple access with collision detection. And as the 802.3 standard evolved, It picked up such names as Thick Ethernet (IEEE 10Base-5), Thin Ethernet (10Base-2), Twisted Ethernet (10Base-T), and now Fast Ethernet (100Base-T)."

Ethernet PC cards now come in a couple of basic varieties — for connecting to an Ethernet LAN via coaxial cable or via two twisted pairs of phone wires, called 10Base-T. See also 10Base-T, Collision Domain, Ethernet Controller, Ethernet Identification Number, Ethernet Switch, Ethertalk, Frame, Gigabit Ethernet, Thinnet and Token Ring.

Ethernet Controller The unit that connects a device to the Ethernet cable. An Ethernet controller typically consists of part of the physical layer and much or all of the data link layer and the appropriate electronics.

Ethernet Identification Number This is a unique, hexadecimal Ethernet number that identifies a device, such as a PC/AT with a SpeedLink/PC16 network interface card installed, on an Ethernet network.

Ethernet II (DIX) Defined by Digital, Intel and Xerox. The frame format for Ethernet II differs from that of IEEE 802.3 in that the header specifies a packet type instead of the packet length.

Ethernet Switch An Ethernet data switch. Ethernet is the most common local area network (LAN) standard in the world today. Ethernet is very cheap, but its approach to congestion management is a bit on the ugly side. Ethernet transmission is over a shared bus, which is much like a big multipoint circuit. When an Ethernet-attached device puts data frames (data packets) onto the network, those frames move in both directions, and pass by all devices on the network. In other words, every attached workstation, printer and host sees the frames, until the intended device sees the data, recognizes its address in the data frame, and takes it off the network. As a result, Ethernet networks can become very heavily congested. While the theoretical Ethernet data rate is 10Mbps (ten million bits per second), they often run at a fraction of that speed — 4Mbps or 2Mbps is not uncommon. One cheap way of reducing Ethernet congestion is through the use of hubs, like 10Base-T. 10Base-T hubs allow the Ethernet to be divided into physical segments at the workgroup level, with each workgroup representing a "community of interest." This segmentation process serves to reduce congestion by confining traffic to all those Ethernet stations on

AN ETHERNET FRAME

Preamble	Destination address	Source address	Type	Data up to 1500	Frame check sequence
8 bytes	6 bytes	6 bytes	2 bytes	bytes	4 bytes (contains CRC check)

ffic This is the process of selecting which
wed into a certain portion of a network, such
ıetwork. It is also the process of determining
nsmitted first, then next, and so on. The traf-
ı a filter, or a set of specifications, to deter-
ȝ through or not.
ion notice.
a Kiell's strange idea of completing a trans-
ıron.
Group A last-choice trunk group that
traffic and which may receive first-route
ȝre is no alternate route.
e An AIN version of call forwarding, allow-
nbers to be programmed or re-programmed
Additionally, priority access can be extend-
llers based on password privilege. For
ly privileged callers would be forwarded to
consideration of the high cost of airtime.
interface portion of the Apple Macintosh
Jnlike running Windows on top of DOS,
the finder and system requires both to be

ırd protocol specified in RFC-742. A pro-
this protocol lists who is currently logged
In short, finger is a computer command
ıtion about people using a particular com-
ıames and their identification numbers.
tine. An individual digital channel of a
ır. A rake receiver can support a number
ıe combined to form a stronger received

hine A computer system with a defined
s and defined transitions form state to
ne inputs, two identical state machines
ıntically.
ıation Processing Standard. See also

ous standards for data communications.
ıg channel interface for IBM 360/370
p, two copper cables (one for data, one
ı, 1.5-4.5 Megabytes per second with a
121 meters.
omeone. In Scotland during medieval
nted to get rid of you, but not kill you,
your house. Hence, the origin of the
d." The story goes that in the early part
an NCR salesman lost an order, when
ce, they put his desk out on the front
ȝsk. Then they "fired" the salesman.
erial, device, or assembly of parts
, other than at a cable penetration of a
he spread of fire along a cable.
700s the larger American cities, such
pes to bring in water. This was not for
nting purposes. The pipes were made
s placed end to end and buried under
was a fire, the firemen would punch
ump the water out, and once finished
ng a wooden stake of the proper size.
ıg."
levice, or assembly of parts installed
ire-rated wall or floor to prevent pas-
gases through the rated barrier, (e.g.,
arated rooms or spaces).

Firestop System A specific construction consisting of the material(s) (firestop penetration seals) that fill the opening in the wall or floor assembly and any items that penetrate the wall or floor, such as cables, cable trays, conduit, ducts, pipes, and any termination devices, such as electrical outlet boxes, along with their means of support.

Firestopping The process of installing specialty materials into penetrations in fire-rated barriers to reestablish the integrity of the barrier.

Firewall A combination of hardware and software which limits the exposure of a computer or group of computers to an attack from outside. The most common use of a firewall is on a local area network (LAN) connected to the Internet. Without a firewall, anyone on the Internet could theoretically jump onto the corporate LAN and pick up any information on or dump anything to any of the computers on the LAN. A firewall is a system or combination of systems that enforce a boundary between two or more networks. There are several types of firewalls — packet filter, circuit gateway, application gateway or trusted gateway. A network-level firewall, or packet filter, examines traffic at the network protocol packet level. An application-level firewall examines traffic at the application level — for example, FTP, E-mail, or Telenet. An application-level firewall also often readdresses outgoing traffic so it appears to have originated from the firewall rather than the internal host. NEC PrivateNet Systems Group issued a White Paper called Connecting Safely to the Internet — A study in Proxy-Based Firewall Technology. In that White Paper, they defined an Internet firewall:

The primary purpose of an Internet firewall is to provide a single point of entry where a defense can be implemented, allowing access to resources on the Internet from within the organization, and providing controlled access from the Internet to hosts inside the organization's internal networks. The firewall must provide a method for a security or system administrator to configure access control lists to establish the rules for access according to local security policies. All access should be logged to ensure adequate information for detailed security audit.

A traditional firewall is implemented through a combination of hosts and routers. A router can control traffic at the packet level, allowing or denying packets based on the source/destination address of the port number. This technique is called packet filtering. A host, on the other hand, can control traffic at the application level, allowing access control based on a more detailed and protocol-dependent examination of the traffic. The process that examines and forwards packet traffic is known as a proxy.

A firewall based on packet filtering must permit at least some level of direct packet traffic between the Internet and the hosts on the protected networks. A firewall based on proxy technology does not have this characteristic and can therefore provide a higher level of security, albeit at the cost of somewhat lower performance and the need for a dedicated proxy for each type of connectivity.

Each organization needs to choose one of these basic types of technologies. The right choice depends on the organization's access and protection requirements.

FireWire It's a 100 Mbps serial bus, also known as IEEE 1394. It is geared to become a digital interface for consumer video electronics and hard-disk drives. It's designed for up to 4.5 meters per segment and features six pins per connector. See IEEE 1394, USB, Universal Serial Bus.

Firm Order Confirmation FOC. The form a local phone company submits to another phone company indicating the date when the circuits ordered by the other company will be installed. See FOC for a longer explanation.

Firmware Software kept in semipermanent memory. Firmware is used in conjunction with hardware and software. It also shares the characteristics of both. Firmware is usually stored on PROMS (Programmable Read Only Memory) or EPROMs (Electrical PROMS). Firmware contains software which is so constantly called upon by a computer or phone system that it is "burned" into a chip, thereby becoming firmware. The computer program is written into the PROM electrically at higher than usual voltage, causing the bits to "retain" the pattern as it is "burned in." Firmware is non-volatile. It will not be "forgotten" when the power is shut off. Handheld calculators contain firmware with the instructions for doing their various mathematical operations. Firmware programs can be altered. An EPROM is typically erased using intense ultraviolet light.

First In, First Out See FIFO.

First Office Application The first office to have the guts to try a new system in a real, live production mode. The same thing as a beta test. See also Beta Test.

First Party Call Control A call comes into your desktop phone. You can transfer that call. When the phone call has left your desk, you can no longer control it. That is called First Party Call Control. If you were still able to control the call (and let's say, switch it elsewhere) that would be called Third Party Call Control. First party call control is mostly done at your desk with your telephone or with a card in your PC, which emulates a telephone. Third party call control is usually done via a computer (often a server on a LAN) attached to a special link directly into your PBX. There are some evolving standards in call control — chiefly Microsoft's Windows Telephony and Novell's TSAPI (Telephony Services API). There is no such animal as Second Party Call Control. See Call Control, Telephony Services and Windows Telephony.

First Point of Switching The first exchange carrier location at which switching occurs on the terminating path of a call proceeding from the IXC terminal location to the terminating end office, or the last exchange carrier location at which switching occurs on the originating path of a call proceeding from the originating end office to the IXC terminal location.

First Ring Suppression Caller ID in North America comes in just after the first ring. You don't want to answer the call before the second ring otherwise you will mess up your receiving of Caller ID information. You can simply not answer until the second ring. Or you can get a trunk-based gadget which will turn off the first ring so you or your voice processing equipment won't hear it.

FIS Forms Interchange Standard.

Fish 1. To push a stiff steel wire or tape through a conduit or interior wall. Pull through wires, cable or a heavier pulling-in is then attached to one end of the steel wire. The other end is then pulled until the wire or cable appears.
2. First In Still Here. A non-standard term used in inventory accounting. Roughly equivalent to FILO (First In Last Out), but suggesting that the inventory is not moving because you aren't selling any of it.

Fish Food Internet Webmasters who want to draw attention to new on-line content call the tidbits "fish food." The morsels are posted in "What's new" buttons or "Click here" icons on the home page, so, like the flakes that feed your guppies, they float at the top and attract hungry users. Contributed by Judy Ehrenreich, PaciCare Health Systems, Santa Ana, CA.

inia University to address the ever increasing
re of the ISP market. Today, IDEA claims to be
association of independent Internet Service
in the world. www.auidea.org
I Dispatch Enhanced Network. A wireless
oped by Motorola, iDEN operates in the 800
nd 1.5 GHz radio bands; the 900 MHz devel-
l at operators of digital Commercial Mobile
CMRS), also known as ESMR (Enhanced
le Radio). iDEN is a digital technology using
of VSELP (Vector Sum Excited Linear
16QAM (Quadrature Amplitude Modulation)
and TDMA (Time Division Multiple Access)
iannels of 25 kHz. Through a single propri-
EN supports voice in the form of both dis-
'STN interconnection, numeric paging, SMS
Service) for text, data, and fax transmission.
QAM, SMS, TDMA, and VSELP.
ı **Failure** Automatic Number Identification
in the originating office failed to identify the
ee ANI.
tward Dialing Same as AIOD. It's a PBX
ovides identification of the PBX extension
rd toll calls. This identification may be pro-
c equipment or by attendant identification of

name of a database object (table, view,
trigger, column, default, or rule). An identi-
to 30 characters long.
Distribution Frame.
ed Digital Loop Carrier.
ı used but ready.
. A state of the SCbus or SCxbus Message
ormation is being transmitted and the bus
ı.
A cell used for cell stuffing where rate adap-
As Physical Layer cells, idle cells are
ot, therefore, be replaced by assigned cells
ess of cell multiplexing; this is unlike
which are not necessary at a network level
replaced, therefore. See also ATM Reference
ayer, Rate Adaption and Unassigned Cell.
Code A repetitive pattern (code) that iden-
nel.
Noise Noise which exists in a communica-
n no signals are present.
ination An electronic network which is
to maintain a desired impedance at a trunk
ien that terminal is in an idle state.
ny signal that indicates no data is being sent.
gital Network.
Digital Network Exchange.
al Data Exchange Network.
ause.
Data Rate.
Services.
g xDSL technology which uses ISDN tech-
ansmission speeds of 128 Kbps on copper
8,000 feet. IDSL is a dedicated service for
ons applications, only; whereas ISDN is a
ervice technology for voice, data, video and
ations. IDSL terminates at the user premise
TA (Terminal Adapter). At the LEC CO, the
collocated ISP electronics in the form of

either an IDSL access switch or a IDSL modem bank connected to a router. The connection is then made to the ISP POP via a high-bandwidth dedicated circuit. See also xDSL, ADSL, ISDN, HDSL, RADSL, SDSL and VDSL.

IDSU Intelligent Data Service Unit from ADC Kentrox.

IDT 1. Inter-DXC Trunk.
2. Inter-Machine Digital Trunk.

IDTS Integrated Data Test System. A software package that allows the user to test Analog, Digital, Fractional T-1, and T-1 Circuits, remotely, at the various MCI terminal locations.

IDTV Improved Definition TeleVision. See Improved Definition Television.

IDU 1. Interface Data Unit: The unit of information transferred to/from the upper layer in a single interaction across the SAP. Each IDU contains interface control information and may also contain the whole or part of the SDU.
2. Indefeasible Right of Use. A right to use something, which right cannot be taken away from you, i.e. voided or undone. A term that generally applies, in contemporary terms, to the purchase of an optical fiber within a sheath of fibers owned by another company. Companies that lay optical fiber generally lay much more than they need. They do so because so much of the cost is associated with securing the right-of-way, trenching, burying conduit, etc. So they "lay a lot of pipe," much of which initially is left "dark" (i.e., inactive). They then are in a position to either lease or sell the extra fibers, and the bandwidth they represent. If you buy, rather than lease, a fiber, you have an IRU.

IE Incoming Exclusion.

IEC 1. InterExchange Carrier. Also called an IXC (as in IntereXchange Carrier). In practice, an IEC or IXC is any common carrier authorized by the FCC to carry customer transmissions between LATAs. In practice this means anyone and his brother who print up stationery, rent a few lines and proclaim themselves to be in the long distance phone business. Except for AT&T, regulation of long distance carriers by the FCC is perfunctory. It is less perfunctory by the local state authorities, some of whom still think competition in telecommunications is a mild form of insanity.
2. International Electrotechnical Commission. The international standards and conformity assessment body for all fields of electrotechnology, including electricity and electronics. The IEC publishes a number of international standards and technical reports on a wide variety of subjects including telecommunications (LANs, MANs and WANs), video cameras, electrical cables, communications protocols (e.g., HDLC), Open Systems Interconnection (OSI), optical fiber cables and connectors, and diagnostic X-ray imaging equipment. www.iec.ch

IEEE Institute of Electrical and Electronics Engineers, Inc. IEEE, founded in 1884, says it's the world's largest technical professional society, consisting of over 320,000 members in 147 countries. The IEEE's technical objectives "focus on advancing the theory and practice of electrical, electronics and computer engineering and computer science." The IEEE sponsors technical symposia, conferences and local meetings, and publishes technical papers. It also is a significant standards-making body responsible for many telecom and computing standards, including those standards used in LANs — e.g. the 802 series. www.ieee.org.

IEEE 1394 Also called Firewire. An IEEE data transport bus that supports up to 63 nodes per bus, and up to 1023 buses. The bus can be tree, daisy chained or any combination. It supports both asynchronous and isochronous data. 1394 is a complimentary technology with higher bandwidth (and associated cost) than Universal Serial Bus. Intel told me in summer of 1996 that it was supporting USB for most devices that attach to PC up through audio and video conferencing. Intel told that they are "supporting IEEE 1394 as the preferred interface for higher bandwidth applications such as high quality digital video editing, and connection to new digital consumer electronics equipment. We expect that 1394 will show up in low volumes in 97, and ramp into high volumes in 99." See IEEE and USB.

IEEE 488 IEEE 488 is the most widely-used international standard for computer-to-electronic instrument communication. It is also known as GPIB and HPIB.

IEEE 802 The main IEEE standard for local area networking (LAN) and metropolitan area networking (MAN), including an overview of networking architecture. It was approved in 1990. See IEEE 802 standards.

IEEE 802.1 This IEEE committee defines the LAN Management and bridging standards.

IEEE 802.1d An algorithm, the original version of which was invented by Digital Equipment Corporation, that is used to prevent bridging loops by creating a spanning tree. The algorithm is now documented in the IEEE 802.1d specification, although the Digital algorithm and the IEEE 802.2 handles errors, framing, flow control, and the Layer 3 service interface.

IEEE 802.2 A data link layer standard used with the IEEE 802.3, 802.4 and 802.5 standards. 802.2 is the more modern form of 802.3. Novell recommends that it be used on its NetWare networks in preference to the 802.3 (which will still work). Most Ethernet networks support both 802.2 and 802.3. For more on the 802 series, see the numbers definitions at the front of this dictionary.

IEEE 802.3 A Local Area Network protocol suite commonly known as Ethernet. Ethernet has either a 10 Mbps or 100 Mbps throughput and uses Carrier Sense Multiple Access bus with Collision Detection CSMA/CD. This method allows users to share the network cable. However, only one station can use the cable at a time. A variety of physical medium dependent protocols are supported. This is the most common local area network specification. For a much fuller explanation, see Ethernet.

IEEE 802.3 1Base5 IEEE standard for baseband Ethernet at 1 Mbps over twisted pair wire to a maximum distance of 500 meters. Also called Starlan.

IEEE 802.3 10Base-5 IEEE standard for baseband Ethernet at 10 Mbps over coaxial cable to a maximum distance of 500 meters.

IEEE 802.3 10Base-T Also called 802.3i. 10Base-T is an IEEE standard for operating Ethernet local area networks (LANs) on twisted-pair cabling using the home run method of wiring (exactly the same as a phone system uses) and a wiring hub that contains electronics performing similar functions to a central telephone switch. The full name for the standard is IEEE 802.3 10Base-T. The 10Base-T standard, issued in the fall of 1990, defined the requirements for sending information at 10 million bits per second on ordinary unshielded twisted-pair cabling. The 10Base-T standard defines various aspects of running Ethernet on twisted-pair cabling such as:

- Connector types (typically eight-pin RJ-45),
- Pin connections (1 and 2 for transmit, 3 and 6 for receive),
- Voltage levels (2.2 volts to 2.8 volts peak), and
- Noise immunity requirements to filter outside interference from telephone lines or other electronic equipment.

Ethernet is the most popular LAN in the world. Ethernet run-

mand. *Acronym:* BIS. *See also* management information system.

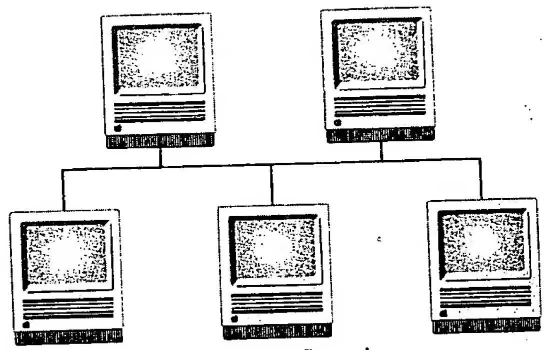
business software *n.* Any computer application designed primarily for use in business, as opposed to scientific use or entertainment. In addition to the well-known areas of word processing, spreadsheets, databases, and communications, business software for microcomputers also encompasses such applications as accounting, payroll, financial planning, project management, decision and support systems, personnel record maintenance, and office management.

bus mastering *n.* In modern bus architectures, the ability of a device controller card—a network adapter or a disk controller, for example—to bypass the CPU and work directly with other devices to transfer data into and out of memory. Enabling devices to take temporary control of the system bus for data transfer and bus mastering frees the CPU for other work. This in turn improves performance in tasks, such as video replay and multiple-user queries to large databases, that require simultaneous data access and intensive processing. The technology known as direct memory access (DMA) is a well-known example of bus mastering. *See also* bus, controller, direct memory access. *Compare* PIO.

bus mouse *n.* A mouse that attaches to the computer's bus through a special card or port rather than through a serial port. *See also* mouse. *Compare* serial mouse.

bus network *n.* A topology (configuration) for a LAN (local area network) in which all nodes are connected to a main communications line (bus). On a bus network, each node monitors activity on the line. Messages are detected by all nodes but are accepted only by the node(s) to which they are addressed. A malfunctioning node ceases to communicate but does not disrupt operation (as it might on a ring network, in which messages are passed from one node to the next). To avoid collisions that occur when two or more nodes try to use the line at the same time, bus networks commonly rely on collision detection or token passing to regulate traffic. See the illustration. *Also called* bus topology, linear bus. *See also* collision detection, contention, CSMA/CD, token bus network, token passing. *Compare* ring network, star network.

bus system *n.* The interface circuitry that controls the operations of a bus and connects it with the rest of the computer system. *See also* bus.



***Bus network.** A bus network configuration.*

bus topology *n. See* bus network.

button *n.* **1.** A graphic element in a dialog box that, when activated, performs a specified function. The user activates a button by clicking on it with a mouse or, if the button has the focus, by hitting the Return or Enter key. **2.** On a mouse, a movable piece that is pressed to activate some function. Older mouse models have only one button; newer models typically have two or more buttons.

button bomb *n.* A button on Web pages with the image of a bomb.

button help *n.* Help information displayed via the selection of buttons or icons. Applications such as the World Wide Web, multimedia kiosks, and computer-aided instruction often use button help icons to ease system navigation.

bypass *n.* In telecommunications, the use of communication pathways other than the local telephone company, such as satellites and microwave systems.

byte \bīt\ *n.* Short for **binary term**. A unit of data, today almost always consisting of 8 bits. A byte can represent a single character, such as a letter, a digit, or a punctuation mark. Because a byte represents only a small amount of information, amounts of computer memory and storage are usually given in kilobytes (1,024 bytes), megabytes (1,048,576 bytes), or gigabytes (1,073,741,824 bytes). *Abbreviation:* B. *See also* bit, gigabyte, kilobyte, megabyte. *Compare* octet, word.

bytecode \bīt´kōd\ *n.* An encoding of a computer program that a compiler produces when the original source code is processed. This encoding is in an ab-

e-text \E´tekst\ *n.* Short for electronic **text**. A book or other text-based work that is available on line in an electronic media format. An e-text can be read on line or downloaded to a user's computer for offline reading. *See also* ezine.

Ethernet \ē´thər-net`\ *n.* **1.** The IEEE 802.3 standard for contention networks. Ethernet uses a bus or star topology and relies on the form of access known as Carrier Sense Multiple Access with Collision Detection (CSMA/CD) to regulate communication line traffic. Network nodes are linked by coaxial cable, by fiber-optic cable, or by twisted-pair wiring. Data is transmitted in variable-length frames containing delivery and control information and up to 1,500 bytes of data. The Ethernet standard provides for baseband transmission at 10 megabits (10 million bits) per second and is available in various forms, including those known as Thin Ethernet, Thick Ethernet, 10Base2, 10Base5, 10Base-F, and 10Base-T. The IEEE standard dubbed 802.3z, or Gigabit Ethernet, operates at 10 times 100 Mbps speed. *See also* baseband, bus network, coaxial cable, contention, CSMA/CD, Gigabit Ethernet, IEEE 802 standards, twisted-pair cable. **2.** A widely used local area network system developed by Xerox in 1976, from which the IEEE 802.3 standard was developed.

Ethernet/802.3 *n.* The IEEE standard for 10- or 100-Mbps transmissions over an Ethernet network. Ethernet/802.3 defines both hardware and data packet construction specifications. *See also* Ethernet.

E-time \ē´tīm\ *n. See* execution time.

etiquette *n. See* netiquette.

ETX *n. See* end-of-text.

Eudora \yōō`dōr´ə\ *n.* An e-mail client program originally developed as freeware for Macintosh computers by Steve Dorner at the University of Illinois, now maintained in both freeware and commercial versions for both Macintosh and Windows by Qualcomm, Inc.

EULA \yōō´lə\ *n. See* End-User License Agreement.

European Computer Manufacturers Association *n. See* ECMA.

European Laboratory for Particle Physics *n. See* CERN.

evaluation *n.* The determination, by a program, of the value of an expression or the action that a program statement specifies. Evaluation can take place at compile time or at run time.

even parity *n. See* parity.

event *n.* An action or occurrence, often generated by the user, to which a program might respond—for example, key presses, button clicks, or mouse movements. *See also* event-driven programming.

event-driven *adj.* Of, pertaining to, or being software that accomplishes its purpose by responding to externally caused events, such as the user pressing a key or clicking a button on a mouse. For example, an event-driven data entry form will allow the user to click on and edit any field at any time rather than forcing the user to step through a fixed sequence of prompts.

event-driven processing *n.* A program feature belonging to more advanced operating-system architectures such as the Apple Macintosh operating system, Windows, and UNIX. In times past, programs were required to interrogate, and effectively anticipate, every device that was expected to interact with the program, such as the keyboard, mouse, printer, disk drive, and serial port. Often, unless sophisticated programming techniques were used, one of two events happening at the same instant would be lost. Event processing solves this problem through the creation and maintenance of an event queue. Most common events that occur are appended to the event queue for the program to process in turn; however, certain types of events can preempt others if they have a higher priority. An event can be of several types, depending on the specific operating system considered: pressing a mouse button or keyboard key, inserting a disk, clicking on a window, or receiving information from a device driver (as for managing the transfer of data from the serial port or from a network connection). *See also* autopolling, event, interrupt.

event-driven programming *n.* A type of programming in which the program constantly evaluates and responds to sets of events, such as key presses or mouse movements. Event-driven programs are typical of Apple Macintosh computers, although most graphical interfaces, such as Windows or the X Window System, also use such an approach. *See also* event.

exa- *prefix* A prefix meaning one quintillion (10^{18}). In computing, which is based on the binary (base-2) numbering system, exa- has a literal value of 1,152,921,504,606,846,976, which is the power of 2 (2^{60}) closest to one quintillion. *Abbreviation:* E.